SCIENCE

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SOME PROBLEMS OF MEDICAL EDUCATION[1]

THE education of medical students has been a subject of perennial interest to both teachers and practitioners for a long time, and although great advances have been made, there is still general dissatisfaction with the results as shown by examination tests and the ability of recent graduates to meet the emergencies or even ordinary duties of professional work.

At the meetings of the council on medical education of the American Medical Association, the confederation of examining boards of the United States and our own association, the faults in preliminary education, in professional training, and the needs of still greater clinical opportunities, have been pointed out and are familiar to you all. Out of all these discussions, two general educational remedies have been advocated.

1. That one or two years of college work, which shall include one year of chemistry, physics and biology, be added to the preliminary training.

2. That a hospital or clinical year be added, making the medical course, as measured by the standards of England and Germany, six years.

In these two propositions certain questions arise which concern this association especially. For us the questions are not merely academic, but questions of administration, standards and pedagogics.

The house of delegates of the American Medical Association at its recent meeting

[1] Presidential address, delivered before the Association of American Medical Colleges at Chicago, February 26, 1913.

decreed that for a medical college to be put in the highest rank, the requirement of one year of college work, including instruction in chemistry, physics and biology, is necessary. This has focused attention on this proposition and many colleges will feel compelled to require it.

In discussing this proposition, the first question that arises is: How is the student to obtain this year's work in the designated sciences?

In states with state colleges or universities, the question has been answered. The high school and university courses are so correlated that with a minimum amount of disturbance the student passes from one to the other. The financial aspect is not a burdensome one, as the fees in the state-supported institutions are relatively small. But in the greater part of the country no such coordination exists, the colleges and universities are disassociated from the high schools, so that there is a greater or less impediment to students passing from the high school to the colleges, as they are not accepted on their high-school credentials. In some, the students are admitted only on examination in addition to their credentials, and others demand special preparation in subjects not included in the high-school course. Universities and colleges should feel it their duty to correlate their entrance requirements with the high-school courses of their locality.

In this connection another obstacle is met with in localities where the universities and colleges are not part of the general educational system, *i. e.*, the attitude of these institutions toward one- or two-year students who are taking the course to meet the medical school requirements. It does not, however, apply to universities with medical schools. The universities frankly admit that they do not want these students, and when we discuss the requirements as related to sciences and languages with them, they say: "Why should we modify our curriculum to meet the needs of these one- or two-year students? We are not conducting this college as a preparatory school for technical or professional education." And the head of one of the largest universities in the east with no professional school attached, said: "If I find men coming here to meet this requirement, I will change the course so that they can not get the science branches demanded in less than three years."

To meet this requirement, must the course be taken only in an institution having the right to grant the B.A. or B.S. degree? Should the requirement read: "One year's work of college standard, which year must include instruction in chemistry, physics and biology. This year must be in addition to the high-school course"?

This raises at once the most important question of equivalents and all the dangers of evasion. It has been suggested that these courses might be given in technical high schools which only admit students after the completion of a high-school course, and in support of the suggestion, it has been claimed that such a course would be much more definite than that given in many literary colleges, and it would be under the supervision of the educational department of the state. Many deny the right of high schools to do the work of the colleges, and, in addition, urge that it is not meeting the spirit of the requirement.

This raises the next question. What is the object of this added year of preparation?

In general terms, the answer is: "Power to grasp professional subjects."

Is this power gained best by increase in general education in the so-called "humanistic" or "culture" courses, or by tech-

nical training in the sciences? The view point of the institution in which the instruction is taken will determine the character of the course. In institutions with medical schools, the course will be correlated to the future needs of the student. In colleges without such affiliation, these courses will be part of the general college régime which deals with education so as to insure a wide and general character to the subjects it embraces, whereas it is imperative for the future use of such studies, whether in engineering or medicine, under the pressure of modern life, that the student should be equipped with the necessary knowledge in the shortest possible time that is compatible with thoroughness. From a practical point of view, generalities must be abandoned and definite limits set. Are the undergraduate college teachers willing to do this, or will they insist on generalities?

This raises the question of the cultural value of the liberal courses as opposed to the so-called science or technical subjects. All agree that "the preparatory training for life should be liberal and humanizing; that the course of study in the college, in addition to having a broadening influence, should also inculcate in the student some specific kind of mental training which will fit him better to take a high rank in whatever career he may happen to select." As students enter the college to later select medicine, the studies should by scope, content and method give him the specific kind of mental training that will better fit him for his life work.

While valid objection might be raised against introducing into the college course professional instruction, as defined by Karl Pearson, *i. e.*, "training in the art of a specific profession," this does not hold against technical education in the underlying subjects of a profession, and for the medical profession these subjects are the natural sciences, chemistry, physics and biology being specified as those most helpful.

It has been said that these subjects are lacking in educational value from the standpoint of "general training"; that they do not provide mental training for the man who has no intention of entering a profession. The answer to this objection is that the fault is not in the subjects, but in the manner in which they are taught, and also in the content of the course. President Hill, of the University of Missouri, has emphasized the value of motive in acquiring knowledge and gaining insight into a subject. "Insight normally brings culture, especially in human life, and vocational motive not only does not interfere with, but tends to foster, the development of a deeper and truer insight into the significance of scientific knowledge."

Can a knowledge of chemistry, physics and biology be acquired in one year of college work with sufficient fulness to be of value to the student in his medical course? There are two opinions on this question: one, that a single year is inadequate; that these subjects should be taught as pure sciences and on general lines with no regard to future use; that in one year the student will have only a verbal acquaintance with things that he does not understand. Those who hold this opinion are urging the two-year course, not so much as a preparation for medicine as for the general cultural value. They would have not more than a single year's work in each of the science branches and more of the general college subjects added.

The other opinion is that one year is a sufficient time in which to gain a familiarity with the *principles* of those subjects which have a bearing on medical sciences.

This is a very different thing from teaching them as medical subjects. It would set definite limits on the course and not try to cover the entire science in a single year. In chemistry the general basic principles underlying the science rather than isolated facts should be taught, and these principles can be learned just as well by studying substances and processes in the laboratory which have a distinct bearing on medicine, rather than on metallurgy or mineralogy. Probably the college course in chemistry is the best standardized of all.

In physics, the student needs a fairly wide knowledge so far as it can be gained without higher mathematical processes. Laboratory instruction should form a large part of it. The important topics are specific gravity or relative density (there should be real understanding of what these terms mean), osmotic pressure and diffusion, hydrostatics, acoustics and its common application to sound, pitch, resonance, optics, laws of refraction and reflection, as applied to mirrors and lenses. Heat; the thermometer, laws of specific heat, cryoscopy, calorimetry and the relation of heat to work. Electricity; the elements of static electricity and of galvanic and foradic currents. In mechanics, the statical aspects only. Much of the dynamics usually taught should be omitted, also the study of absolute temperatures, absolute units. The object of the course in physics is that

the student may gain a comprehensive and connected view of the most important facts and laws of elementary physics. There is need of limiting the course in physics, because the courses in universities and colleges are more adapted to train professional physicists than future practitioners of medicine. The two need a different training. A study of the curricula at many colleges shows that in one single year an elementary course requiring very little mathematics is followed by a highly specialized mathematical course, having practically no reference to the experiences of life.

In the biological course, it is important that the student should become conscious of the characteristics of living things. Without some general biological training, it would be impossible for him to give to his medical physics and chemistry a biological application. By dissection of a few of the lower types, by witnessing a few simple physiological experiments on plants or animals, by examination of simple tissues under the microscope, he should obtain an idea of the correlation between structure and function, the general build of the elementary tissues; and the process of digestion, respiration, assimilation and reproduction, which together make up our conception of a living organism. A comprehensive view of the subject, but well within the power of the student to understand, is rarely given. On the other hand, a great deal of useless information is given and much precious time and energy is wasted on botany, zoology and highly specialized courses.

By such courses, beyond the accumulation of facts in the different sciences which the student may obtain, he should have become an accurate observer, been interested in the art of inquiry, have acquired a fair degree of manual dexterity and use of laboratory instruments, have cultivated proper habits of study and work—in fact, trained for efficient professional study. His mental horizon should be extended, a new attitude of mind toward his work fostered; his reasoning faculties should be developed so that the insistent *"why?"* compels him to seek the answer. To give this training demands that the subjects are taught in an intensive manner, that interest is aroused, that the student feels that the subjects are important, not only as sciences, but for their future professional application. Unfortunately, the generalities

of the college courses do not often give this direction.

It must be borne in mind that it is possible to educate a student away from scientific thought, as well as toward it. It has been disappointing to note the effect of a general college education on medical students. They come to the medical school often unwilling to adjust themselves to the régime. They have lost much of their receptiveness, they are to a degree mentally arrogant, they have a pseudo-philosophical and not a scientific frame of mind. It is for this reason that often the high-school graduate gets more out of the course than the man with a B.A. degree.

In demanding one year of college work as an entrance requirement, the medical schools have not only a right, but a duty, to demand of the colleges that the course be standardized; that it be made worth the students' time, both in content and methods. Otherwise it is useless, both from the cultural and technical standpoint. It will be not a specific, but a quack remedy, prescribed for the cure of our educational illness. I firmly believe in better preliminary education of the medical student, and am only raising these questions that they may be discussed.

What influence will the added year of preliminary training have on the medical course? Will it allow of changes in our present curriculum? For it is conceded that at present it is overcrowded; that the difficulties of medical education are increasing; that the burden is heavy on both teachers and student; that there is a waste of effort that is almost tragic.

The problems of medical education are bound up with the progress in medicine and therefore can not be solved once and for all, but must be constantly under consideration and adjustment. In all consideration of them, certain facts must be kept constantly in mind. The period of study can not be indefinitely extended. There must be a proper proportion between the period of preparation for and practising of a profession. As Professor Starling has so well put it, "The brain of man does not increase in capacity or in power of assimilation with the growth of science." "How is the necessary limited time of medical education to be most profitably employed in imparting to the student such knowledge as is most useful to him in his future career?" The effect of the overloaded curriculum on the student is most harmful. He gets a smattering of many things, instead of a thorough grounding in principles. He forms faulty mental habits, early becomes surfeited and loses interest in the work; everything is gauged by examination value; he has no sense of proportion, small details and facts loom large, basic principles are unimportant. At what point should the unloading begin? What ballast should be thrown overboard?

Notwithstanding the work of the committee on curriculum of this association and that of the council on medical education of the American Medical Association, the usual medical course still contains much useless ballast, some of it traditional, some of it due to demands of state board examinations and some gradual "accretion" due to a desire to meet the advances in medical sciences.

Professor Welch, in opening the discussion on "The Medical Curriculum" at the meeting of this association at Baltimore, said:

> One of the fundamental things is to inquire, What is the object of medical education? To make good doctors; there is no question that that should be the underlying conception in our schemes for medical education, and unless you can define a given course as bearing on that training, it has no place in the medical curriculum. If the training in physiology can not be shown to be to make good doctors, it is

not defensible. The same can be said of pathology, or any other subject in the curriculum. The ultimate aim of medical education is to make good practitioners of medicine. Another thing that confronts us at the start of any consideration of the medical curriculum is: What kind and what amount of knowledge can the student acquire during the four years of his medical education? The most you expect is to give to the student a fair knowledge of the principles of the fundamental subjects in medicine, and the power to use the instruments and methods of his profession; the right attitude toward his patients and toward his fellow members in the profession; above all, to put him in the position to carry on his education, because his education is only begun in the medical school. The student does not go out a trained practitioner, a trained pathologist, or a trained anatomist or a surgeon.

President Pritchett in the introduction to the "Bulletin on Medical Education in Europe" says:

> Even if one may assume that students enter the study of medicine properly trained in the fundamental sciences, the problem of the curriculum is a serious one. The report shows a general tendency toward overburdening. The question naturally arises, What ought the course of study of a technical or professional school to accomplish? The medical school can not turn out finished doctors. It can not teach all that it is important for the practitioner to know. Under these circumstances it does best to accept frankly certain limitations, and so to train its students that they will be disposed subsequently to remedy their own deficiencies. Inclination of this kind appears most likely to result from a training that prescribes only the indispensable minimum, requiring in addition more thorough performance in a few directions and leaving opportunity for still further effort to those of greater energy, interest or ability.

Is not some of the overload due to our having ignored the above facts, because we have tried to teach all the sciences and all the art and science of medicine, to turn out specialists in medical sciences, in research work, and in medicine and surgery.

The past decade has seen a most marvelous improvement in the teaching of medical sciences and opportunities for laboratory work. Gone, never to return, are the purely professional courses in anatomy, chemistry and physiology, given by busy practitioners or recent graduates, whose knowledge of the subject was but little in advance of the students, and who were able to repeat a few simple experiments. To-day the laboratory courses in the medical sciences are far more extensive than even the German schools. In this country the laboratory courses are paramount and the lecture courses subordinate; in Germany it is the reverse. The development of these courses has been so rapid that the necessity for setting limitation on them has not been observed. President Pritchett says:

> The medical curriculum, extended as it is in Europe, over five years, has reached the limits of its capacity; it can contain no more. Exactly the same process has occurred in medicine as has taken place in the training of engineers. In fact, experience in these two kinds of technical education during the last fifty years has been strikingly similar. Most naturally the medical school and the engineering school have endeavored to include in their teaching some knowledge of the new sciences developed in the last half century and of their application. As a result, the burden devolved upon students of medicine and of engineering has grown enormously. The respective curricula have been formed almost altogether by accretion, something being put in, little or nothing taken out. As a result, both the medical student and the engineering student are called upon to carry, not only a heavier load, but a load made up of more parts.

As students come to the medical schools with better preparation in the sciences, there is a tendency to add more and more detail; to extend the laboratory courses and insist on all the precision, the rigor and the abstraction of the research laboratory; to teach the subjects as pure science and not as applied; to lose sight of the ability of the student; to go beyond the need of the future practitioners of medicine, and plan the course as if all were to be

chemists, physiologists, pathologists or research workers. The whole body of students should not be compelled to spend a disproportionate amount of time and energy upon topics which will be of use to a few only. Opportunity should be given to those who wish to pursue any subject beyond that given as part of the general instruction, but unfortunately our rigid curriculum prevents it. The student's time is too fully occupied to allow of electives or to take extra work in subjects in which he is interested, without neglecting obligatory courses. It has been well said that our system is a "lock-step" one.

The student should be so instructed in the fundamental principles of the science subjects that after graduation he may keep pace intelligently and be able to utilize further discoveries of these sciences as applied to scientific medicine. Beyond this we can not go.

In our attempt to make our student scientific we are defeating our object by insisting on too great detail, before he can understand the principles. The teaching of a subject as a pure science, without application to clinical subjects, causes him to have no motive or interest in it and to throw it overboard as soon as examinations are past.

While all agree that the inductive method is the proper one, when pushed to the extreme the method breaks down. This is a woeful waste of the students' time in the "work it out for themselves" method of some teachers.

The statement is frequently made that students do not carry with them beyond the examination period that general knowledge of anatomy, chemistry, physiology and pathology which should be a lifelong possession.

The reason that the students do not have a better grasp on the science subjects is because medical education has become less homogeneous. Under the old system, the primary or science subjects were taken at the same time that the clinical ones were. The student thus gained an inkling of the relation of his science subjects to his clinical work. At the present time, this relation is not apparent to the student unless it is pointed out to him. The science years are becoming more and more divorced from the clinical, and the fact should be recognized and the tendency corrected.

From my study of the methods of instruction given in many of the medical schools, I believe that teachers of the science branches are largely to blame for this. That the science subjects should be taught by specialists is conceded by all, and they are rightly in charge of the years devoted to their subjects. They have had a hard fight to gain recognition and are hostile toward any movement to introduce into these years any clinical work, and many have gone so far as to insist that it is not their function to give any definite application to the subject. This has made necessary the introduction of applied courses in the different subjects to bridge the gap between the science and clinical years. Too often these courses when given have to be taught by teachers not connected with the science subjects. The science teachers, especially if engrossed in research work, are too apt to teach only the more scientifically interesting features and consider that they have done their duty when they have given the lecture courses of their subject, and leave to their assistants the more important laboratory instruction. The majority of these giving the laboratory courses are young and inexperienced teachers who have not had the advantage of a medical training, and their

only knowledge of the subject is that obtained in the pure science courses. If any question of application arises, they are unable to answer it and therefore discourage all such inquiries or resent them as "catch questions."

Teachers in the science branches should be in thorough sympathy with the future professional work of the students, and I am of the opinion that teachers in medical schools should have taken a complete medical course as part of their training. There are many eminent teachers in medical schools who have not had this training, but they have been long in contact with medical institutions and have a saving sympathy with the clinical side. In the large university schools and where the school is divided, there is danger in this lack of sympathy with clinical work, which attitude the science teachers are only too ready to criticize harshly in the clinical man if he does not show sufficient interest in their particular science.

Medical progress is being retarded by lack of coordination of science and clinical departments. The lack of training in clinical medicine too often prevents the science teacher from being of assistance to the clinician. Medical and surgical methods do not always fit in with laboratory technique. The complexity of the problem causes him to give little scientific value to the investigations not made in a laboratory. It is this attitude of the science teacher toward the introduction of clinical work or clinical methods in the first two years of the course, that is causing not only the student to fail to appreciate the value of and becoming interested in the subjects, but also to make him less able to apply the knowledge that he has gained of laboratory technique to his work in the clinic and wards. His *work* in the laboratory has been on frogs and the lower animals only. When he comes to his clinical years he finds that he can not use the apparatus with which he has become familiar to human beings. He finds new factors enter into the experiment which confuse his previously formed conceptions; he can not interpret his findings. The science teacher claims that this applied instruction should be given by the clinical teachers and also says that they should be competent to do it, which latter contention we grant, but what are the two years of instruction in the laboratories for but to prepare the student for his clinical work? Wherever possible methods and apparatus should be employed that can be used in clinical investigations. The burden of this instruction should not be thrown on the clinical years, already so overcrowded as to make a hospital year a necessity.

To insure a better correlation between science branches and clinical years and allow of unloading, the hard and fast lines that are tending to separate the second and third year of the course should be obliterated. As students come better prepared in the underlying sciences and are able to accomplish more in the same time, instead of extending the courses in pure science, correlated clinical laboratory courses should be introduced in the second year.

If the teaching staff of the science branches can not give these courses, then clinical teachers, most likely young men who have been trained in laboratory method, should give them. This would be the best introduction possible for the clinical subjects, and students so prepared could more rapidly advance in the third year. It would permit of omitting much of the lecture course in this year and allow an early contact with clinical material. To obtain such readjustment hearty coopera-

tion is needed from science and clinical teachers.

The establishment of state board examinations has been of great aid to medical education. It has raised the general standards of the profession, and secured a more uniform curriculum over the entire country. It has, however, had a decided influence on the overloading of the curriculum, as they have yoked the old methods with the new. The necessity for arranging the examinations to meet the training of graduates of years ago, as well as the recent, has been detrimental to progress and has encouraged cram-quiz book methods and put a premium on ability to answer questions, calling for mere detail information of the subjects. The time has come when state boards of examiners should recognize the changes that have occurred in methods of medical education; that the student who is best educated has not the best knowledge of small and unessential details; that to meet the requirements of the state boards he has to have recourse to quiz compends for much that is of no practical use to him. The new methods have been in force long enough to establish a class by itself and for licensing there should be one type for the graduate of former days and one for the more recent. As at present conducted, both in content and method, it is satisfactory to neither class. This association, by the cooperation of the Federation of State Medical Boards, could be of great value in correcting this defect. The state boards are appreciating this defect as well as medical educators, and would welcome any plan which would allow of a practical examination, both laboratory and clinical.

The difficulty in arranging such an examination is the lack of money and laboratory and clinical facilities. States with centers of medical education could easily get the facilities by holding the examinations in those places and using the college laboratories and clinics and hospitals. Different dates could be arranged for various sections. The states should consider that it is their duty to provide the necessary funds. That such a plan is feasible is shown by the ease with which large numbers of candidates for the positions of hospital interne are examined, both by written and practical examination.

Examinations have, and probably will be, the means of testing the character of instruction given by the medical schools and the knowledge of the students, but they should be adapted to give a true index. They must coordinate with the methods of instruction. At the present time they do not. Rating colleges according to the ability of students to pass these examinations is putting a premium on only such instruction as will enable the student to successfully meet the test. It is exalting narrow training over broad education. Evaluating bodies should not place too much value on the percentage of failures and passing as an index of instruction in the colleges.

From members of the general profession one constantly hears the harsh criticism that recent graduates are deficient in detailed knowledge of this or that specialty. That while skilled in laboratory methods of diagnosis, they have acquired little of the art of medicine. They insist that many new topics ought to be added to the course of study.

Much of the overburdening of the clinical years has been due to adding topics or extending courses in the special branches to meet these criticisms. The profession as a whole should appreciate that the student must, in his college course, gain his training in scientific methods if he is ever to have it. That only the essentials can be

taught thoroughly. Faulty training in the essentials is caused by trying to do too much. That only so much of the special branches can be given as to make them safe practitioners, not immature specialists.

It is desirable that every practitioner should know many things about his relation to society at large, to allied professions and their problems, to organize charities and their activities, and the business methods of his own profession. However, these topics should not be introduced into the medical curriculum, they are part of the postgraduate education, which every physician should feel it his duty to acquire.

The need of unloading and correlation is a most pressing one, and it is our duty as an association of medical colleges to point that way.

The complex question of a hospital or clinical year has been under discussion for some time by this and other associations. That the student needs more extended clinical experience before beginning the practise of his profession is conceded by all. There is not the same unanimity of opinion as to the advisability of making a clinical year obligatory or whether it should be demanded by the colleges for the degree of M.D. or by the states as a requirement for the right to practise.

Before a decision can be reached many administrative and pedagogic questions must be answered. As the necessary data have not been gathered, this association should cooperate with other bodies in making a collective investigation of the subject. As a large percentage of medical graduates now voluntarily take one or more years of hospital interneship I believe the first step should be to give both academic and legal recognition to this postgraduate training.

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The Psychiatric Clinic and the Community[1]

The increasing interest shown in the study of human activities is one of the most significant and hopeful signs of our times. Momentous as was the impulse given to science by Copernicus, Galileo and Newton one result of their investigations was to direct attention to a universe in which human beings were considered to be merely passive observers of natural phenomena. So absorbed did man become in formulating hypotheses to explain a theoretical universe of which he did not form a part, and in delving into the records of his own past history, he neglected the study of present activities. At last the course of events warned him that the lessons of remembrance or the hypertrophied historical sense had become "a malady from which men suffer."

The dedication of a psychiatric clinic is an event of more than ordinary importance to a community, as it marks the awakening of intelligent interest in man, as an active thinking being. Having striven for centuries to improve the methods for recording his fanaticisms, superstitions, sins of omission and of commission, and failures to adjust life to meet new conditions, he has begun at last to take rational measures to improve his lot, and to acquaint himself with the laws on which the social organism rests. As the value of this benefaction to the community will depend directly upon the intelligent use of resources and energy made available for rendering more effective service to humanity, may we not profitably devote a few moments in attempting to formulate some of the problems to the solution of which this clinic is dedicated. Errors in judgment committed now, in

[1] Address delivered at the opening exercises of the Henry Phipps Psychiatric Clinic, The Johns Hopkins Hospital, Baltimore, Md., April 16, 1913.